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Influence of growing location , harvesting season and post-harvest storage time on carotenoid biosynthesis in orange sweet potato (Ipomoea batatas) tuber flesh (Article)

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Abstract

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Carotenoid content in plants differs due to several factors such as cultivar, maturity, climate, locality and storage . Improving the nutritional values of sweet potato is an important breeding goal and understanding the regulation, genetics and inheritance of carotenoid biosynthesis are vital to achieve this. Environmental conditions can have a marked influence on the accumulation of carotenoids in sweet potato tubers. Little is known about the effects of location , post-harvest storage time and harvesting season particularly on carotenoid biosynthesis . Therefore, this study aimed to investigate the effects of growing location , harvesting season and storage time on carotenoid biosynthesis in orange sweet potato tuber flesh . The results showed that orange sweet potato tubers contained α -carotene and β -carotene in the first and second harvesting season (year 2011 and 2012), whereas lutein and zeaxanthin were detected only in the third harvesting season (year 2013). Analysis of carotenoid profiles of the orange sweet potato tubers grown in three different locations confirmed that the harvesting season had a major effect on the total carotenoid content and the individual carotenoid compounds. The post-harvest storage time of sweet potato tubers also appears to have distinct effects on carotenoid biosynthesis , the magnitude of the effects being dependent on the storage time , harvesting season and location . The results of this study will help to understand the effects of location , year of harvesting season and storage time on carotenoid accumulation in orange sweet potato tubers. © All Rights Reserved.

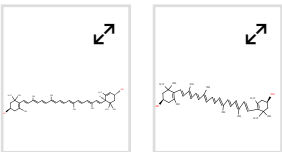
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Anuar, S., Wan, O.A.
Extraction, characterization and total phenolic content of local (Malaysian) green sweet potato (Ipomoea Batatas) leaves
(2014) *International Journal of Science Commerce and Humanities*, 2 (5), pp. 175-182. Cited 2 times.
- ☐ 2
Aurelie, B.
(2010) *Investigating carotenoids loss after drying and storage of orange-fleshed sweet potato*. Cited 3 times.
United Kingdoms: University of Greenwich, PhD. Thesis
- ☐ 3
De Azevedo, C.H., Rodriguez-Amaya, D.B.
Carotenoid composition of kale as influenced by maturity, season and minimal processing
(2005) *Journal of the Science of Food and Agriculture*, 85 (4), pp. 591-597. Cited 66 times.
doi: 10.1002/jsfa.1993
- ☐ 4
Bendich, A., Olson, J.A.
Biological actions of carotenoids
(1989) *FASEB Journal*, 3 (8), pp. 1927-1932. Cited 443 times.
- ☐ 5
Bendich, A.
Carotenoids and the immune system
(1990) *Chemistry and Biology*, pp. 323-335. Cited 34 times.
Krinsky, N.I., Mathews, M.M. and Roth, R.F. (Eds), New York: Taylor, Plenum Press
- ☐ 6
Bendich, A.
Recent advances in clinical research involving carotenoids ([Open Access](#))
(1994) *Pure and Applied Chemistry*, 66 (5), pp. 1017-1024. Cited 65 times.
doi: 10.1351/pac199466051017

- ☐ 7 Bovell-Benjamin, A.C.
Sweet Potato: A Review of its Past, Present, and Future Role in Human Nutrition

(2007) *Advances in Food and Nutrition Research*, 52, pp. 1-59. Cited 197 times.
ISBN: 0123737117; 978-012373711-3
doi: 10.1016/S1043-4526(06)52001-7

- ☐ 8 Britton, G.
Carotenoids
(2008) *Natural Functions. Birkhäuser Verlag Basel*, 4, pp. 309-324. Cited 100 times.
-

- ☐ 9 Byers, T., Perry, G.
Dietary carotenes, vitamin C, and vitamin E as protective antioxidants in human cancers
(1992) *Annual Review of Nutrition*, 12, pp. 139-159. Cited 448 times.
doi: 10.1146/annurev.nu.12.070192.001035
-

- ☐ 10 Carvalho, E., Fraser, P.D., Martens, S.
Carotenoids and tocopherols in yellow and red raspberries
(2013) *Food Chemistry*, 139 (1-4), pp. 744-752. Cited 39 times.
doi: 10.1016/j.foodchem.2012.12.047
-

- ☐ 11 Kurz, C., Carle, R., Schieber, A.
HPLC-DAD-MSⁿ characterisation of carotenoids from apricots and pumpkins for the evaluation of fruit product authenticity
(2008) *Food Chemistry*, 110 (2), pp. 522-530. Cited 81 times.
doi: 10.1016/j.foodchem.2008.02.022
-

- ☐ 12 Cunningham Jr., F.X., Gantt, E.
Genes and enzymes of carotenoid biosynthesis in plants
(1998) *Annual Review of Plant Biology*, 49, pp. 557-583. Cited 667 times.
-

- ☐ 13 Davidson, A.
(1999) *Oxford Companion to Food*, p. 912. Cited 227 times.
New York: Oxford University press
-

- ☐ 14 (2008) *Food Agriculture Organization*. Cited 171 times.
Statistical database. Retrieved on March 12, 2010 from
<http://faostat.fao.org>
-

- ☐ 15 (2002) *Vitamin A in human vitamin and mineral requirements*, pp. 87-107. Cited 629 times.
Report of joint FAO/WHO expert consultation, Bangkok, Thailand: FAO
-

-
- ☐ 16 Gerster, H.
Potential role of beta-carotene in the prevention of cardiovascular disease.
(1991) *International Journal for Vitamin and Nutrition Research*, 61 (4), pp. 277-291. Cited 79 times.
-
- ☐ 17 Hagenimana, V., Low, J., Anyango, M., Kurz, K., Gichuki, S.T., Kabira, J.
Enhancing vitamin A intake in young children in Western Kenya: Orange-fleshed sweet potatoes and women farmers can serve as key entry points
(2001) *Food and Nutrition Bulletin*, 22 (4), pp. 376-387. Cited 38 times.
<http://fnb.sagepub.com/>
doi: 10.1177/156482650102200407
-
- ☐ 18 Hanif, H.K., Bahareh, S., Marzieh, M.-N.
(2012) *Extraction of carotenoids from crustacean waste with vegetable oils*, pp. 26-27.
The 11th International and the 4th National Congress on Recycling of Organic Waste in Agriculture, April.
Isfahan, Iran
-
- ☐ 19 Haskell, M.J., Jamil, K.M., Hassan, F., Peerson, J.M., Hossain, M.I., Fuchs, G.J., Brown, K.H.
Daily consumption of Indian spinach (*Basella alba*) or sweet potatoes has a positive effect on total-body vitamin A stores in Bangladeshi men
(2004) *American Journal of Clinical Nutrition*, 80 (3), pp. 705-714. Cited 127 times.
-
- ☐ 20 Henkel, C.
(1996) *Recent Research on Carotenoids*. Cited 2 times.
Lagrange: Illinois
-
- ☐ 21 Howitt, C.A., Pogson, B.J.
Carotenoid accumulation and function in seeds and non-green tissues ([Open Access](#))
(2006) *Plant, Cell and Environment*, 29 (3), pp. 435-445. Cited 276 times.
doi: 10.1111/j.1365-3040.2005.01492.x
-
- ☐ 22 Jay, B., Pandya, T.V., Ramana, R.
Analysis of certain biochemical changes associated with growth and ripening of pumpkin fruit in relation to its seeds development
(2010) *Journal of Pure and Applied Sciences*, 18, pp. 34-39. Cited 8 times.
-
- ☐ 23 Jing, P., Noriega, V., Schwartz, S.J., Giusti, M.M.
Effects of growing conditions on purple corncob (*Zea mays* L.) anthocyanins
(2007) *Journal of Agricultural and Food Chemistry*, 55 (21), pp. 8625-8629. Cited 52 times.
doi: 10.1021/jf070755q
-

- ☐ 24 Krinsky, N.I.
Actions of carotenoids in biological systems
(1993) *Annual Review of Nutrition*, 13, pp. 561-587. Cited 358 times.
<http://www.annualreviews.org/journal/nutr>
doi: 10.1146/annurev.nu.13.070193.003021
-

- ☐ 25 Krinsky, N.I.
Carotenoids in medicine
(1990) *Carotenoids: Chemistry and Biology*, pp. 279-291. Cited 44 times.
Krinsky, N. I., Mathews, M. M., Roth, R.F. (Eds.), New York: Taylor. Plenum Press
-

- ☐ 26 Krinsky, N.I.
The biological properties of carotenoids ([Open Access](#))
(1994) *Pure and Applied Chemistry*, 66 (5), pp. 1003-1010. Cited 200 times.
doi: 10.1351/pac199466051003
-


- ☐ 27 Kuloba, M.M.
(2013) *Post harvest practices and the quality of farm processed and stored orange fleshed sweet potato chips in Tiriki West Division*
Vihiga County, Western Kenya: University of Nairobi, MSc thesis
-

- ☐ 28 Kusano, S., Abe, H.
Antidiabetic activity of white skinned sweet potato (*Ipomoea batatas* L.) in obese Zucker fatty rats ([Open Access](#))
(2000) *Biological and Pharmaceutical Bulletin*, 23 (1), pp. 23-26. Cited 64 times.
<http://www.jstage.jst.go.jp/browse/>
doi: 10.1248/bpb.23.23
-

- ☐ 29 Lee, C.Y., Simpson, K.L., Gerber, L.
(1989) *New York's Food and Life Sciences Bulletin*, 126.
-

- ☐ 30 Lewis, D.H., Bloor, S.J., Schwinn, K.E.
Flavonoid and carotenoid pigments in flower tissue of *Sandersonia aurantiaca* (Hook.)
(1998) *Scientia Horticulturae*, 72 (3-4), pp. 179-192. Cited 20 times.
doi: 10.1016/S0304-4238(97)00124-6
-

- ☐ 31 Low, J.W., Arimond, M., Osman, N., Cunguara, B., Zano, F., Tschirley, D.
Ensuring the supply of and creating demand for a biofortified crop with a visible trait: Lessons learned from the introduction of orange-fleshed sweet potato in drought-prone areas of Mozambique
(2007) *Food and Nutrition Bulletin*, 28 (2 SUPPL.), pp. S258-S270. Cited 36 times.
-

- ☐ 32 Failla, M.L., Thakkar, S.K., Kim, J.Y.
In vitro bioaccessibility of β -carotene in orange fleshed sweet potato (*Ipomoea batatas*, Lam.)
(2009) *Journal of Agricultural and Food Chemistry*, 57 (22), pp. 10922-10927. Cited 48 times.
<http://pubs.acs.org/doi/pdfplus/10.1021/jf900415g>
doi: 10.1021/jf900415g
-
- ☐ 33 Márkus, F., Daoood, H.G., Kapitány, J., Biacs, P.A.
Change in the carotenoid and antioxidant content of spice red pepper (Paprika) as a function of ripening and some technological factors
(1999) *Journal of Agricultural and Food Chemistry*, 47 (1), pp. 100-107. Cited 143 times.
doi: 10.1021/jf980485z
-
- ☐ 34 Mathews-Roth, M.M.
Carotenoids and cancer prevention  experimental and epidemiological studies
(1985) *Pure and Applied Chemistry*, 57 (5), pp. 717-722. Cited 54 times.
doi: 10.1351/pac198557050717
-
- ☐ 35 Mathews-Roth, M.M.
recent progress in the medical applications of carotenoids ([Open Access](#))
(1991) *Pure and Applied Chemistry*, 63 (1), pp. 147-156. Cited 54 times.
doi: 10.1351/pac199163010147
-
- ☐ 36 Moeller, S.M., Jacques, P.F., Blumberg, J.B.
The Potential Role of Dietary Xanthophylls in Cataract and Age-Related Macular Degeneration
(2000) *Journal of the American College of Nutrition*, 19, pp. 522S-527S. Cited 172 times.
doi: 10.1080/07315724.2000.10718975
-
- ☐ 37 Norshazila, S., Irwandi, J., Othman, R., Yumi Zuhani, H.H.
Carotenoid content in different locality of pumpkin (*Cucurbita moschata*) in Malaysia
(2014) *International Journal of Pharmacy and Pharmaceutical Sciences*, 6 (SUPPL. 3), pp. 29-32. Cited 7 times.
<http://www.ijppsjournal.com/Vol6Suppl3/7.pdf>
-
- ☐ 38 Othman, R.
(2009) *Biochemistry and genetics of carotenoid composition in potato tubers*. Cited 24 times.
New Zealand: Lincoln University, Ph.D. Dissertation
-
- ☐ 39 Panda, S.H., Naskar, S.K., Ray, R.C.
Production, proximate and nutritional evaluation of sweet potato curd
(2006) *Journal of Food, Agriculture and Environment*, 4 (1), pp. 124-127. Cited 17 times.
<https://www.wfpublisher.com/journal>
-

- ☐ 40 Patricia, M.
(2012) *Maintaining Soil Fertility*
Retrieved on April 16, 2014 from:
<http://people.oregonstate.edu/~muirp/sustfert.htm>
-
- ☐ 41 Rao, A.V., Rao, L.G.
Carotenoids and human health

(2007) *Pharmacological Research*, 55 (3), pp. 207-216. Cited 963 times.
doi: 10.1016/j.phrs.2007.01.012
-
- ☐ 42 Rockholm, D.C., Yamamoto, H.Y.
Violaxanthin de-epoxidase: Purification of a 43-kilodalton luminal protein from lettuce by lipid-affinity precipitation with monogalactosyldiacylglyceride (Open Access)

(1996) *Plant Physiology*, 110 (2), pp. 697-703. Cited 87 times.
<http://www.plantphysiol.org/>
doi: 10.1104/pp.110.2.697
-
- ☐ 43 Rodriguez-Amaya, D.B., Kimura, M.
(2004) *Handbook for carotenoid analysis*. Cited 360 times.
Harvest Plus Technical Monograph 2. Washington, DC and Cali: International Food Policy Research Institute (IFPRI) and International Center for Tropical Agriculture (CIAT)
-
- ☐ 44 Rodriguez-Amaya, D.B.
(2001) *A guide to carotenoids analysis in food*. Cited 797 times.
Washington DC: ILSI Press
-
- ☐ 45 Rodriguez-Amaya, D.B.
(1997) *Carotenoids and food preparation: The retention of pro-vitamin A carotenoids in prepared, processed, and stored foods*. Cited 173 times.
Opportunities for Micronutrient Intervention. Retrieved from
http://pdf.usaid.gov/pdf_docs/Pnacb907.pdf
-
- ☐ 46 Rodriguez-Amaya, D.B.
Changes in carotenoids during processing and storage of foods.

(1999) *Archivos latinoamericanos de nutrición*, 49 (3 Suppl 1), pp. 38S-47S. Cited 93 times.
-
- ☐ 47 Rodriguez-Amaya, D.B., Evelyn, B.R., Jaime, A.
Advances in food carotenoid research: chemical and technological aspects, implications in human health
(2006) *Journal Nutrition*, 12 (1), pp. 101-121. Cited 15 times.
-
- ☐ 48 Rosa, M.V.A., Danielle, I.T.O., Jose, L.V.C., Werito, F.M., Ronoel, L.O.G.
(2011) *Stability of biofortified sweet potato flour*
25th IAPRI Symposium on Packaging [Poster]
-

-
- 49 Seow-Mun, H., Amru, N.B., Chandran, S.
Comparative study on the antioxidant activity of leaf extract and carotenoids extract from *Ipomoea batatas* var
(2011) *oren (sweetpotato) leaves*. *World Academy of Science, Engineering and Technology*, 5, pp. 10-26.
-
- 50 Siti Hasidah, N., Khatijah, I.
Food uses of tuber crops
(1994) *Proceeding of the National Seminar on Tuber Crop Production and Utilization*, pp. 184-196. Cited 2 times.
5-7 Sept. Kuantan, Malaysia
-
- 51 Van Den Berg, H., Faulks, R., Granado, H.F., Hirschberg, J., Olmedilla, B., Sandmann, G., Southon, S., (...), Stahl, W.
The potential for the improvement of carotenoid levels in foods and the likely systemic effects

(2000) *Journal of the Science of Food and Agriculture*, 80 (7), pp. 880-912. Cited 357 times.
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1097-0010](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1097-0010)
doi: 10.1002/(SICI)1097-0010(20000515)80:7<880::AID-JSFA646>3.0.CO;2-1
-
- 52 Van Jaarsveld, P.J., Faber, M., Tanumihardjo, S.A., Nestel, P., Lombard, C.J., Benadé, A.J.S.
β-carotene-rich orange-fleshed sweet potato improves the vitamin A status of primary school children assessed with the modified-relative-dose- response test

(2005) *American Journal of Clinical Nutrition*, 81 (5), pp. 1080-1087. Cited 235 times.
-
- 53 Van, R.H., Prins, W.H.
(1993) *The role of plant nutrients for sustainable food crop production in Sub-Saharan Africa*. Cited 21 times.
VKP (Dutch Association of Fertilizer Producers). Leidschendam, The Netherlands
-
- 54 Lima, V.L.A.G., Mélo, E.A., Maciel, M.I.S., Prazeres, F.G., Musser, R.S., Lima, D.E.S.
Total phenolic and carotenoid contents in acerola genotypes harvested at three ripening stages

(2005) *Food Chemistry*, 90 (4), pp. 565-568. Cited 118 times.
doi: 10.1016/j.foodchem.2004.04.014
-
- 55 Wellburn, A.R.
The Spectral Determination of Chlorophylls a and b, as well as Total Carotenoids, Using Various Solvents with Spectrophotometers of Different Resolution

(1994) *Journal of Plant Physiology*, 144 (3), pp. 307-313. Cited 2253 times.
doi: 10.1016/S0176-1617(11)81192-2
-
- 56 Woolfe, J.A.
(1992) *Post-harvest procedures: Sweet potato an untapped food source*, p. 643. Cited 3 times.
Cambridge, UK: Cambridge University Press
-

□ 57 Zaharah, A., Tan, S.L., Abdul Aziz, A.M., Ibrahim, B.
Performance evaluation of sweet potato clones through multi-locational trials
(2004) *Journal of Tropical Agriculture and Food Science*, 32 (2), pp. 147-153. Cited 2 times.

□ 58 Zaman, Z., Roche, S., Fielden, P., Frost, P.G., Niriella, D.C., Cayley, A.C.D.
Plasma concentrations of vitamins a and e and carotenoids in alzheimer's disease
(1992) *Age and Ageing*, 21 (2), pp. 91-94. Cited 163 times.
doi: 10.1093/ageing/21.2.91

□ 59 Ziegler, R.G.
(1991)
Vegetables, fruits, and carotenoids and

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